Chatbot: A Virtual Companion

Anushka Chougule[1], Namrata Patole[2], Sakshini Patil[3], Pratik Tondare[4]

Department of E&TC, SKNCOE, SPPU, Pune

Abstract—**Most of the time, Students have to visit colleges for inquiries of various information like tuition fees, Term schedules, etc. during their admission process or as per their daily needs, which is very time-consuming. Hence, to overcome this problem a chatbot can be developed. A chatbot is a computer program that can understand human language and respond like humans. The project is about the interaction between users and chatbot which can be accessed from anywhere anytime. The purpose of this project is to make it more accessible, convenient and to enhance user experience. Tkinter is the tool used to set up the Graphical User Interface. Also, college map is provided, which will help new students and visitors to find the departmental buildings easily.**

Keywords – **Machine Learning, Natural Language Processing, Bag of words, chatbot,tkinter**

I. INTRODUCTION

A chatbot is a software application used to conduct an online chat conversation via text or text-to-speech, providing direct contact with a live human agent. Designed to convincingly simulate the way a human would behave as a conversational partner, chatbot systems typically require continuous tuning and testing, and many in production remain unable to adequately converse, while none of them can pass the standard Turing test.

Chatbots are used in dialog systems for various purposes including customer service, request routing, or information gathering. While some chatbot applications use extensive word classification processes, natural-language processors, and sophisticated AI, others simply scan for general keywords and generate responses using common phrases obtained from an associated library or database. Most chatbots are accessed online via website popups or through virtual assistants. They can be classified into usage categories that include: commerce, education, entertainment, finance, health, news, and productivity.

II. LITERATURE SURVEY

To reduce time consuming process of students who need to visit universities or colleges to collect various information like tuition fees, Term Schedule, etc. and also to lower a manpower in providing required information to visitors, a chatbot is developed. The project uses the concept of Artificial Intelligence and Machine Learning. PHP Language is utilized for the development of Chatbot [1]. The chatbot is to create a human-like conversation between a human and a machine,to reduce the work stress. Chabot will be able to answer multiple persons at the same time, people don't have to visit the college to get their query solved and it will be available 24/7. By using RASA, machine learning, LSTM, RNN chatbot has been developed Chatbot are the replacement of humans to continue generalized queries through online. In this paper, they implemented Chatbot which is developed and implemented using IBM virtual Assistant which is also called as IBM Watson [2]. Chatbot is used for a college website in order to make it more accessible, convenient and to enhance user experience. Campus navigation through Google Maps is an additional feature which is integrated into the chatbot to better assist the user. Using Artificial Intelligence and Deep Learning technologies, a chatbot EVA was created. The system, GALGOBOT eases the query solving process by saving time and effort. GALGOBOT, achatbot system acts as a companion and can be integrated on college websites. The software would also ask various questions to get precise answers to the query by utilizing Natural Language Processing (NLP) model which is helpful in the process. To design and implement natural and intuitive interaction modalities is a primary research field in the human-computer interaction domain. Systems that can interact with user in their natural language are being researched fast at present. chatbot is a computer application that interacts with users using natural language in a similar way to imitate a human travel agent. a successful implementation of a chatbot system can analyze user preferences and predict collective intelligence [3][4].

III. PROPOSED SYSTEM

The purpose of a chatbot is to automate conversations and interactions between a computer system and humans, typically using natural language processing and artificial intelligence techniques. Chatbots can be used to perform a variety of tasks, including:

1. Customer service: Chatbots can assist customers in finding information, answering frequently asked questions, and providing support.

2. Sales and marketing: Chatbots can be used to generate leads, make product recommendations, and provide customer service for sales and marketing purposes.

3. Personal assistant: Chatbots can be used as virtual assistant, helping users manage their schedules, to-do lists, and other tasks.

4. Information retrieval: Chatbots can retrieve information from databases or the web and provide it to users on demand.

5. Entertainment: Chatbots 0can be designed for entertainment purposes, such as playing games or telling jokes.

To develop and train models capable of executing the actions outlined below, multiple Deep Learning techniques are used:

• The text-to-voice feature helps the person to understand the output answer if notable to read properly.

• The queries received from the user is analyzed and pre-processed in order toextract the most appropriate response from the chatbot database.

• Upon completion, the chatbot cordially greets the user goodbye and its purpose isaccomplished.

A. Natural language Processing
Natural language Processing (NLP) uses algorithms to understand the user's message. NLP is supported by Natural Language Toolkit (NLTK) which is a Python library having inbuilt tokenizers. Chatbots use NLP to recognize the user's aim during the conversation. The amount of training data is the key to having a good conversation with the user and the data quality determines the ability of the Chatbot to recognize the intent and generate the appropriate response.

B. Libraries
Libraries like Natural Language Tool Kit (NLTK), JavaScript Object Notation (JSON), Pickle, NumPy, and Random were used to implement the bot. NLTK is aPython library for statistical NLP that can perform many operations such as tokenizing and stemming. The intents dataset is stored as a JSON file. The pickle module is used for serialization and deserialization of data structure. NumPy can perform linear algebra operations.

C. Tokenization
Tokenization helps in splitting a large quantity of text into smaller segments called "Tokens" based on the requirement. These tokens help to find patterns and is one of the base steps for lemmatizations. There are two types of tokenization - word and sentence tokenization.

D. Stemming
Lemmatization is a text normalization technique for NLP. It helps to reduce the words to their root woods by removing the suffixes. This saves a lot of time while processing the words. WordNetLemmatizer imported from Wordnet is used.

E. Predicting classes and Response Selection
Classification refers to a predictive modeling problem where a class label is predicted for a given example of input data. Once the class is predicted, a randomresponse is extracted from that class and displayed to the user.
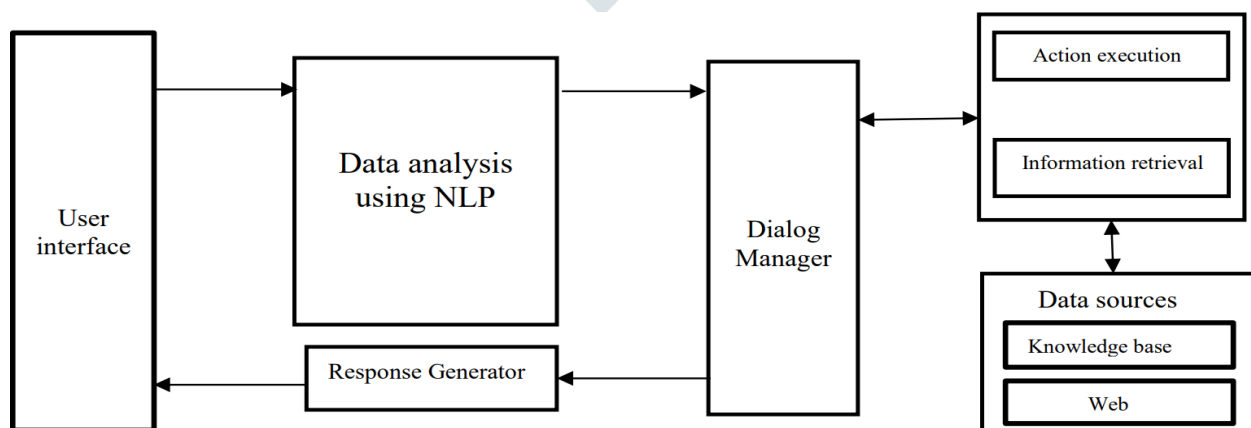

Fig 1. Block Diagram of the proposed system

The block diagram of the system in Fig 1. shows the working of the chatbot. Chatbots aim to understand users' queries and generate relevant response to meet their needs. Simple chatbots scan users' input sentences for general keywords, skim through their predefined list of answers, and provide a rule-based response relevant to the user's query. Firstly, the user gives input through the user interface. Input is converted into structured data to be understood by a machine. This is done using Natural language Processing. After that, the system fetches the required data in the data source and then returns the answer to the user.

NLP section: NLP stands for Natural Language Processing. It is a form of AI that gives machines the ability to not just read, but to understand and interpret human language. With NLP, machines can make sense of written or spoken text and perform tasks including sentiment analysis, and automatic text summarization. NLP consists of Tokenization, Normalization, entity recognition, and semantic analysis.

Data source: Once the dialog manager gives the command, the action of extracting the relevant data from the data source is executed. Data source is information, that the chatbot relies on to fetch the data used to respond to users. When Dialogue manager: data processed through NLP is then data passes on to the dialogue manager. A dialog manager is a component responsible for the flow of the conversation between the user and the chatbot. It keeps a record of the interactions within one conversation to change its responses down the line if necessary.

Most appropriate data is found it is returned to the dialogue manager where the suitable response is generated and returned to the user. Data source consists of a knowledge base and the web. The knowledge base is mostly the dataset where all the information is saved and a chatbot can search for answers in this data set.

IV. IMPLEMENTATION

The following technologies and libraries were used for the implementation:

A. Natural Language Toolkit (NLTK)
The Natural Language Toolkit is an open-source library for the Python programming language. The Natural Language Toolkit (NLTK) is a platform used for building Python programs that work with human language data for application in statistical natural language processing (NLP). It contains text-processing libraries for tokenization, parsing, classification, stemming, tagging, and semantic reasoning.

B. Torch
Torch is similar to TensorFlow library. Pytorch framework is based on torch library and python language. Torch supports various mathematical operations. It is a machine learning library also it is open source. Torch is written in Lua scripting language. PyTorch dynamically defines computational graphs, unlike the static approach of TensorFlow. It is used for creating deep neural networks.

C. Pickle
Pickle in Python is primarily used in serializing and deserializing a Python object structure. In other words, it's the process of converting a Python object into a byte stream to store it in a file/database, maintain program state across sessions, or transport data over the network.

D. Bag of words
At a much granular level Deep learning model needs numerical data for computation and not textual one. Therefore, to represent words as numerical values we use the concept of Bag of Words (BoW). It represents the occurrence of words within a document. This model just checks if the word occurs in the document or not. It also keeps a track of the word counts and ignores the grammatical details.

E. Dialogue Box
A dialog manager is the component responsible for the flow of the conversation between the user and the chatbot. It keeps a record of the interactions within one conversation to change its responses down the line if necessary.

F. Tkinter
The most frequently used method from the multiple options Python offers for developing GUI is Tkinter. Tkinter is used for Graphical user interface, development of the chat window, text box, and proper positioning of buttons.
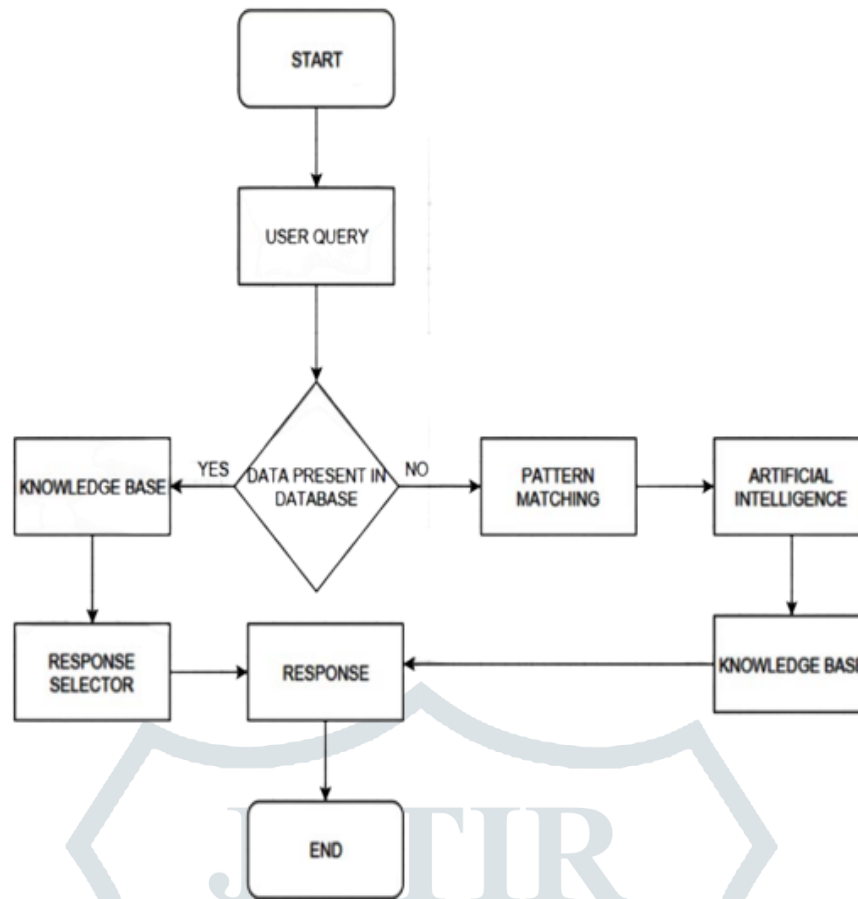
Fig 2. Flowchart

The above flowchart explains about the working of the chatbot. It starts from user starting the conversation, when the user asks any question, its intent will be first matched with any intent present in the database. It will check with the knowledge base of the chatbot and if the answer is present in the knowledge base, it will provide the sufficient answer. When the answer to the question is not available in the database, then with the help of pattern matching and artificial intelligence algorithm, an answer close to the actual answer will be prepared and stored in knowledge base which willbe provided as answer to the required question. The chatbot to be developed will be web-based. This chatbot will provide answers to all the questions whose answers are predefined in the database. Artificial Intelligence will be provided with the help of machine learning. Machine Learning will be done in Python language.
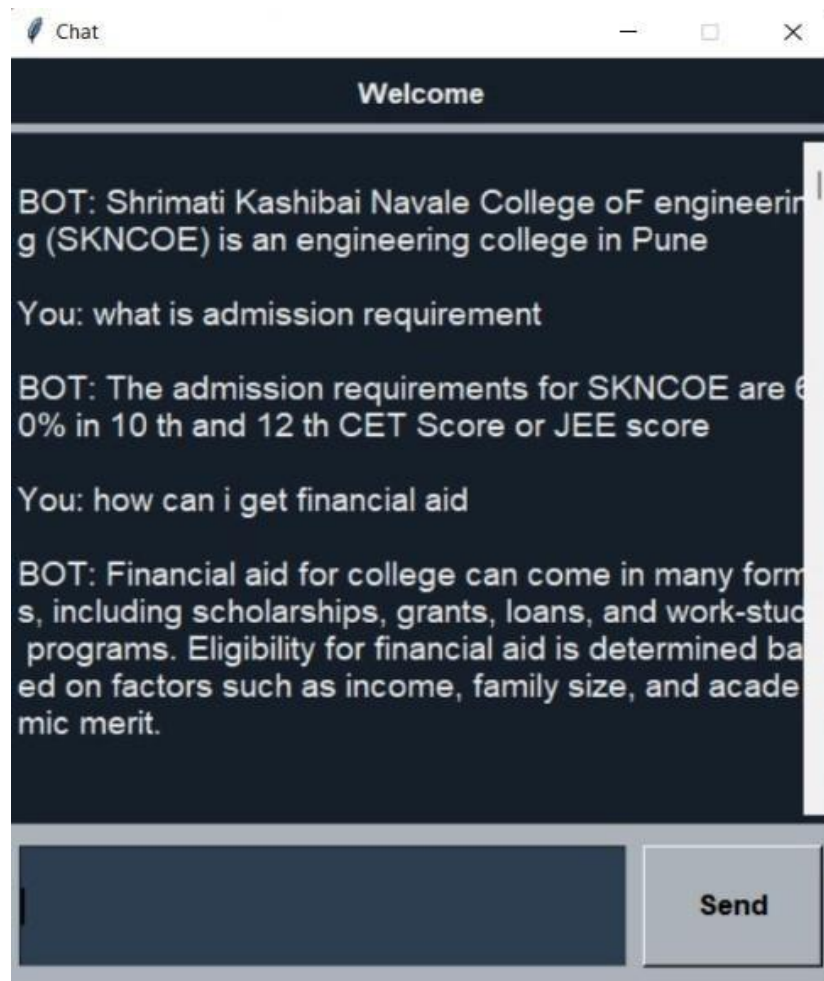
V. RESULTS

Fig 3. Responses

Chatbots are computer programs designed to mimic human conversations using artificial intelligence and natural language processing. They have become increasingly popular in recent years, and many businesses and organizations are using them to improve their customer service and engage with their audience. Interface is created using Tkinter. It is a Python library that allows developers to create graphical user interfaces (GUI) for their applications. With Tkinter, you can create windows, buttons, labels, and other GUI elements that users can interact with. The implemented Chatbot gives output in text to voice format. Chatbots that provide output text to voice format are known as text-to-speech (TTS) chatbots. These chatbots are designed to convert text-based messages into spoken words, allowing users to interact with them through voice commands. When the chatbot is implemented, initially the pop up of chatbot appears, as shown in above figure. So, the questions can be asked to the chatbot using the textbox that is provided at the bottom of the box. When a user begins asking queries in the chatbot, the query is searched in the database. The data base is created using some patterns through which it can generate similar answers which is not present in database. This is done using machine learning. Machine learning helps to predict accurate answer based on their training. Moreover, NLP (natural language processing) enables machines to understand and process the human language. So, it helps to understand human language and response in same way. When response is found in the database it is displayed to the user with the text to voice feature else the system notifies the admin about the missing response in the database and gives a predefined response to the user.

VI. CONCLUSION

In this model, college specified chatbot system is made that can be custom fitted to education domain chatbot, in addition to this chatbot system in the college website or webpage can make it more user interactive as it responds to the user queries very accurately. Moreover, it will save time of managers as well as of visitors and hence, will maintain the crowd. Additionally, it would reduce the manpower and can respond to same question many times. To make responses given by the chatbot system more meaningful, the administrator has to train the chatbot system with more information regarding the college and increase the scope of knowledge base.

REFERENCES

[1]Amey Tiwari, Rahul Talekar and S.M. Patil, "College Information Chat Bot System", *International Journal of Engineering Research and General Science, 2017.*

[2]Amey Tiwari, Rahul Talekar, Prof.S.M.Patil, "College information chat bot system" *International Journal of Engineering Research and General Science (IJERGS) Volume: 5, Issue: 2, Page no: 131-137| March-April 2017.*

[3]Tarun Lalwani, Shashank Bhalotia, Ashish Pal, Shreya Bisen, VasundharaRathod, "Implementation of a Chatbot System using AI and NLP*", International Journal of Innovative Research in Computer Science & Technology,Volume-6, Issue-3, May 2018.*

[4]Mondal, M. Dey, D. Das, S. Nagpal and K. Garda, "Chatbot: an automatedconversation system for the educational domain," *2018 International Joint Symposium on Artificial Intelligence and Natural Language Processing (iSAI-NLP), 2018.*

[5]Souali, K., Rahmaoui, O., Ouzzif, M.&. El Haddioui, I. "Recommending Moodle Resources Using Chatbots", *2019 15th International Conference on Signal-Image Technology & Internet-Based Systems (SITIS), 2019.*

[6]PanitanMuangkammuen, Narong Intiruk, Kanda Runapongsa Saikaew, "Automated Thai-FAQ Chatbot using RNN-LSTM", *22nd International Computer Science and Engineering Conference (ICSEC), May 2019.*

[7]N. P. Patel, D. R. Parikh, D. A. Patel and R. R. Patel, "AI and WebBased Human-Like Interactive University Chatbot (UNIBOT)," *2019 3rd International conference on Electronics, Communication and Aerospace Technology (ICECA), Coimbatore, India, 2019.*

[8]H. K. K., A. K. Palakurthi, V. Putnala and A. Kumar K., "Smart College Chatbot using ML and Python," *2020 International Conference on System,Computation, Automation and Networking" (ICSCAN), Pondicherry, India, 2020.*

[9]W. Mahanan, J. Thanyaphongphat, S Sawadsitang, S Sangamuang., "College Agent: The Machine Learning Chatbot for College Tasks", *The 7th International Conference on Digital Arts, Media and Technology (DAMT) and 5th ECTI Northern Section Conference on Electrical, Electronics, Computer and Telecommunications Engineering (NCON) SKNCOE. Pune-41, Dept. of E&TC Engineering.*

[10] Cutinha, D. D., Chiplunkar, N. N., Maved, S., & Bhat, A. *Artificial Intelligence-Based Chatbot Framework with Authentication, Authorization,and Payment Features. In Advances in Artificial Intelligence and Data Engineering (pp. 179-187). Springer, Singapore*